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sufficiently to reduce unknown quantities to a point where they do not materially damage the results.

The subjects of these investigations are new and are regarded as being the most difficult ones ever undertaken by a statistical office. Together they have required the printing of about 70,000,000 blanks; and they are of greater magnitude than that of any census previous to 1850 and are equal that of any census previous to 1870.

THE MEASUREMENT OF PRICE MOVEMENTS.

BY PROFESSOR ROLAND P. FALKNER, OF THE UNIVERSITY OF PENNSYLVANIA.

Two investigations have been undertaken; first, one to ascertain by statistical means the effect of the tariff on prices and wages, and second, an investigation of the history of prices from 1840 down to the present time. The details of the collection of these materials were in the hands of the Department of Labor. For the value of the returns, for their accuracy, the Department of Labor is a sufficient guaranty. The department has canvassed all the possible cases which could have been brought to bear on the subject and obtained results which have been adequate to the purpose the committee had in view. The work I had the pleasure of conducting for the committee was the analysis of the returns as presented to me by the Department of Labor.

In the first place we have criticised the prices. These were the first pre-requisites of the investigation, and unless the series were a comparable series it could not be used for the purpose we have had in view. While the methods of ascertaining prices may be very far from ideal, we can construct a series by which we can make historical comparisons. Should the prices be wholesale or retail? If we take the standpoint of the consumer undoubtedly they should be retail. I do not intend to discuss the question whether wholesale prices would not be better adapted to the discussion of monetary problems. I think there are some aspects of the question that favor that view. While retail prices would be specially desirable in ascertaining the general level of the cost of living, they are imperfect when we consider a long period; and we were obliged to substitute wholesale prices, taking the ground that there is a more or less fixed ratio between wholesale and retail prices, and that, in a considerable time, the fluctuation of the wholesale prices are expressed in the fluctuations of the retail prices. For a short time that is not the case, but for a long time it might be approximately correct.

A second point is the scope of the index numbers. Unquestionably, taking the standpoint of the consumer we must include a very large number of articles, not only food products, but also manufactured products, products in the various shapes and forms in which they enter directly into consumption. A third point is the choice of a base line. Different base lines have been used, 1845–59, 1865–70, 1871, etc.; there is no reason why a series of years should be taken in preference to a single year except the general statistical one that in a number of years the abnormal features in the series of years tend to disappear. There may be conditions where a single year would be just as normal and just as suitable for the purpose of combination as any series of years. In the present case the year 1860 has been taken as such a basis. The investigation shows that the fluctuation was extremely slight in 1859–60–61, and the year 1860 is for all practical purposes a normal year. And since 1860 is a sort of dividing point in our history, it happened to turn out that we could get prices for 1860 in a great many instances and could not get them for 1859. The only caution necessary is that we should not select a base line in an abnormal period. If we should select a base line on the average of the years 1865–70 in this country we should get very distorted results.

The fourth point of criticism is the method of combination. Three methods have been considered. First, the simple average of prices. Under certain conditions this may be very well adapted to the purpose. If I have nineteen or twenty articles the articles included in my list will be apt to be of approximately equal importance. Even were that not the case it is conceivable that, should the general movement of prices be uniform throughout the group, the result would be approximately correct. The method of simple averages, as adopted by economists, has been tested by experience and shown to be approximately correct. The second method, that of ascertaining the total consumption, is one that presupposes statistics that we have not got. The third method, based on consumers' budgets, which was pursued by the Senate Finance Committee, shows a refinement of patient and labored detail that none of the other methods presents, and I think that the work of this committee has made a distinct advance in this matter. And I hope that the methods we have pursued will bear the test of time, and that we will have been found to have applied methods that are scientifically correct and that have been adequate to the purpose which we have had in view.

Discussion.

Professor Ross: I feel compelled to criticise, or rather to amend, the standard set up, from the standpoint of money. I think that it may be given as a sound principle that the debtor should restore to the creditor a quantity of satisfaction equal to that which he received. That means not power to purchase raw materials, capital or labor, or anything of that sort, but power to purchase goods that yield satisfaction, "goods of the first rank." If, then, we attempt to form a standard that includes satisfaction, we must include a certain kind of labor, namely services. We should include also the prices of household services to make the thing perfect in theory, and of teachers, of physicians, of ministers. We should include also the ordinary wages for what is called common day labor.

Professor Giddings: I should like to ask Professor Falkner to tell us somewhat more in detail how the committee got the index number from the data he speaks of. You say, for example, that food stands in the relation of 40 to 15 as compared with textiles. In making up your index number do you take the price and in some way deal with that ascertained price on the basis of 40 to 15 per cent. and get your index number?

Professor Falkner: Yes, that is done in the case of each quotation. The price of food products as a group occupied 41 per cent. Inside of that group we had the divisions of meat, vegetables, sugar and a host of other things. We obtained the proportions in which these articles were used and in forming the index number that particular article of food would combine in these different indexes, in a manner to give it the importance which it occupied in consumption. We had to use an average relative price for such groups as furniture and utensils, but there is no group that comprises above two to five per cent of the total consumption in which the different elements of the indexes are not blended in the actual way in which they are consumed in actual life.

Professor Taussig: If I understand rightly, the final index number is ascertained in a comparison in which food counts for 41, textiles for 15, etc.

Professor Faulkner: That is the process exactly.

Professor Taussig: So far as the question of arithmetical standard is concerned, I have found that if you take a simple arithmetical or geometrical mean without taking any account whatever of the proportion in which the commodities enter into consumption, it is striking how little different it is from the result of the more elaborate computation. I have come to believe that the best way, after all, is to take a great number of commodities and take the simple arithmetical mean. I am inclined to think that you will get results as good as any by that simple and inexpensive process.

Professor Falkner: I agree that it is a fact, yet I see no reason why it should be; and the larger the number of articles the greater the danger that the result will not come out in the proper way. While I agree that with a limited number of articles comprising the main products and raw materials, the result would be the same whatever plan we adopted, the system of weights or of simple average, it seems to me that the larger the number of articles included the less the probability that the results of simple average would be like the results found in the computation that I made. At present they do come out strikingly similar; 99.52 on the basis of simple average and 99.56 on the basis of weight average.